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EXAMINER

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/788,556	Applicant(s) BEYER ET AL.	
	Examiner Helene R. Rose	Art Unit 2163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-90 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-90 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on February 27, 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1/18/05 & 4/29/05</u> | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

1. Claims 1-90 have been presented for examination.
2. Claims 1-90 have been rejected.

Information Disclosure Statement

3. The information disclosure statement (IDS) filed on 1/18/2005 and 4/29/2005, accordingly, the information disclosure statement has been considered by the examiner.

Claim Objections

4. Claims 9 and 11-36,38-39, 60-85, and 87-88 are objected to because of the following informalities: Claims 9 and 11-36,38-39, 60-85, and 87-88 have parentheses such as: capturing (b), determining (c), and communicating (d) and so forth stated at the beginning of each claim limitation. Examiner suggests removing these parentheses from the beginning of each claim. Appropriate correction is required.
5. Claims 20,22-23,25-28, and 39 are objected to because of the following informalities: Claims 20,22-23,25-28, and 39, since the claim limitations stated within the claim are indicated separately and not combined in a paragraph format per se, indicates that each claim limitation defines a point, i.e. bullet, therefore, the comma, after each claim limitation must be replaced with a semi-colon. Appropriate correction is required.

Claim Rejections – 35 U.S.C- 112

6. Claims 10,14,20,22-23,25-28,32-33,35-36,38-39-39,59,63,69,71-72,74-77,81-82,84-85, and 87-88 are rejected under 112, second paragraph. Claims 10,14,20,22-23,25-28,32-33,35-36,38-39-39,59,63,69,71-72,74-77,81-82,84-85, and 87-88 recite the following limitation “or”, this limitation renders the claim vague and indefinite, because the term “or” is considered to be alternative language.

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Therefore, the limitation renders the claim vague and indefinite, because it is unclear as to how the examiner should interpret the claim limitation as it relates to "or".

7. Claims 12-28, 30-33, 36, 48-49, 61-77, 79-82, and 85 are rejected under 112, second paragraph.

Claims 12-28, 30-33, 36, 48-49, 61-77, 79-82, and 85 recite the following limitation "if", this limitation renders the claim vague and indefinite, because the term "if" is considered to be alternative language.

Therefore, the limitation renders the claim vague and indefinite, because it is unclear as to how the examiner should interpret the claim limitation as it relates to "if".

Claim Rejections – 35 U.S.C 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims rejected under 35 U.S.C. 102(b) as being anticipated by Jain et al (US Patent No. 5,806,075, Date of Patent: September 8, 1998).

Claims 1, 19, 29, 40, 48-49, 50, 68, 78, and 89-90:

Regarding claims 1, 19, 29, 40, 48-49, 50, 68, 78 and 89-90 discloses a method/computer readable medium, with the same functionality/claim limitations, Jain teaches a method/computer readable medium for providing convergence of data copies in asynchronous data replication in a database system (Figure 1, all features, illustrates computerized systems containing one or more locations containing copies of data, Jain), the database system including a plurality of nodes with a plurality of table copies (Figure 3, illustrates a plurality of replication tables, Jain), comprising:

(a) labeling rows of the plurality of table copies with a monotonic number, a copy identification, and propagation controls (Figures 8A and 8B, wherein replication tables is including row level replication information, and wherein monotonic number, i.e. timestamp, is interpreted to be the execution time, as

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defined in applicant specification on page 17, line 3, and wherein a timestamp is the current time of an event that is recorded by a computer), a copy identification (column 4, lines 15-18, wherein original modifications associated with data item can be propagated to remote copies of the same data items, column 8, lines 50-53, wherein order processing is defined, and column 18, lines 60-64, wherein original order processing is performed, Jain), and propagation control (column 7, lines 29-36, wherein propagation is defined, column 4, lines 11-14, wherein conflicting modifications at the remote site, and column 6, lines 57-63, wherein a trigger is a procedure that is executed when a modification, e.g. update, insert, or delete, occurs to a row in table, Jain);

(b) asynchronously capturing at least one labeled change to any row of any of the plurality of table copies from a database recovery log (column 7, lines 7-21, wherein recovery log, i.e. redo log contains undo information, wherein information that can be used to roll back changes made to data after an event, such as system failure, when such error occurs the transactional updates made prior to the error, must be undone to maintain the data integrity in existence prior to the updates, Jain);

(c) determining that the captured change is to be communicated to others of the plurality of table copies (column 7, lines 37-45, wherein data modification to other data sites, and wherein the tables include transactions, transaction nodes, call, call-nodes, and exceptions, Jain) wherein;

(d) communicating the captured change to the others of the plurality of table copies (column, 7, lines 50-64, wherein the transaction table contains information that are performed on the data and that use deferred remote procedure calls, i.e. DRPC's, such as transaction identifier, i.e. transaction_id, delivery order number, i.e. DON, start time, deferring user identifier, and destination list, Jain); and

(e) applying the communicated change to the others of the plurality of table copies (column 6, lines 65-66, Jain), wherein the applying comprises:

(e1) detecting a conflict for the communicated change with at least one row of a target table copy of the plurality of table copies (column 10, lines 8-15, wherein multiple conflicting updates may occur to

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different copies of replicated data, wherein one transaction, T1, can update one copy of record A, C1, and a second transaction, T2, can update a second copy of record A, C2, if T1 is propagated to C2, T1 can overwrite T2's update and vice versa, wherein the present invention detects this type of execution, Jain);

(e2) determining a priority for the communicated change if the conflict is detected (column 22, lines 18-22, Jain); and

(e3) changing the target table copy in accordance with the detected conflict and the determined priority for the communicated change (REFER to e2, wherein this limitation has been address, Jain), wherein the changing comprises:

(e3i) controlling propagation of the change applied to the target table copy (column 13, lines 62-64, wherein value changes in the local copy, Jain);

(e3ii) insuring convergence of the plurality of table copies to the same state (Figure 2B, diagrams 120 and 130 and column 5, lines 45-50, wherein database A and database B contain identical entries and values for each entry, Jain); and

(e3iii) installing the communicated changes into the target table copy (column 5, lines 56-58, wherein inserting is interpreted to be installing, an entry in the orders table to reflect the order, wherein the process is reflected in Figure 2B, the one and two of the basic transactions illustrated, Jain).

Claims 2, 41, and 51:

Regarding claims 2, 41, and 51, teaches wherein the monotonic number comprises a non-decreasing time value, wherein the time values for each of the plurality of table copies are in a common time base (Figure 3, wherein transaction table is illustrated, and within that table defines a start time for each transaction, wherein this is interpreted to be a non-decreasing time, Jain).

Claims 3, 42, and 52:

Regarding claims 3, 42, and 52, Jain teaches wherein the monotonic number is automatically applied to a changed table copy in response to a user-induced change (column 8, lines 6-14, wherein the

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time field is interpreted to be the monotonic number, i.e. timestamp as defined in applicant specification on page 17, line 3, wherein it reflects the time that the transaction was started, deferring the user field identifies the user who initiated the deferred transaction procedure call, Jain).

Claims 4, 43, and 53:

Regarding claims 4, 43, and 53, Jain teaches wherein the copy identification is assigned to each of the plurality of table copies, wherein the copy identification uniquely identifies each of the plurality of table copies, wherein the copy identifications for each of the plurality of table copies have an ordering property (Figure 2B-2C and 2D1-2D2, all features, wherein ordering property is defined, Jain).

Claims 5, 44, and 54:

Regarding claims 5, 44, and 54, Jain teaches wherein the copy identification is automatically applied to a changed table copy in response to a user induced change (column 11, lines 10-19, wherein the order of modifications is crucial, the DON, i.e. document order number can be used to retain the modification order and the DON field is assigned a original transaction, the time field of the new transaction table entry is set to the current time, the deferring user identifier is assigned the value of the user that originated the original transaction, Jain)

Claims 6, 45, and 55:

Regarding claims 6, 45, and 55, Jain teaches wherein the propagation controls comprise a delete label and a conflict label (column 6, lines 57-63, wherein a trigger is a procedure that is executed when a modification, e.g. update, insert, or delete, occurs to a row in table and column 22, lines 18-22, wherein identify conflicts of procedures is defined, Jain).

Claims 7, 46, and 56:

Regarding claims 7, 46, and 56, Jain teaches wherein the delete label indicates that a row delete in any of the plurality of table copies is not to be communicated to the others of the plurality of table copies (column 16, lines 28-32, wherein the remote table entry is deleted from the remote table, after the delete

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replication variable is reset at processing block, and wherein the processing ends at block, i.e. interpreted to be the plurality of table copies, Jain).

Claims 8, 47, and 57:

Regarding claims 8, 47, and 57, Jain teaches wherein the conflict label indicates that an implicit row delete in any of the plurality of table copies is to be communicated to the others of the plurality of table copies (column 14, lines 22-26 and column 22, lines 7-14, Jain).

Claims 9 and 58:

Regarding claims 9, 58, Jain teaches wherein the capturing (b) comprises:

(b1) accessing at least one entry of the database recovery log pertaining to the labeled change (column 8, lines 38-43, wherein transaction is to be executed to replicate changes made by the transaction on the local data site and transaction_id can be used to access an entry in the transaction table, Jain);

(b2) determining a type of the labeled change (column 8, lines 55-61, wherein procedures can be defined without being a part of a transaction and information regarding a either type of procedure is retained in the calls table, the calls table contains a unique identifier, call identifier, i.e. call_id, that can order a call within a transaction, Jain);

(b3) extracting old column values and new column values of the labeled change from the database recovery log entry (column 14, lines 3-14, wherein the old values, or a subset, uniquely identify the row that is the target of the modification, and wherein the update operation is performed, the old values would be use to detect conflicts, and wherein the old value of the local data and the current values at the remote site may indicate that separate operation has been performed, Jain); and

(b4) extracting changed key column values and unchanged key column values from the database recovery log entry (column 17, lines 57-63, wherein concurrent updates are made to disjoint sets, wherein in disjoint sets is interpreted to be a method of extracting, of non primary key columns, lost updates are prevented only when the updates are to columns whose values have been changed, i.e. those column

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changed at the originating sites as indicated by a difference between the old_value and new_value parameters and column 15, lines 23-25, wherein concurrent modifications to disjoint sets of non-primary field values can be permitted, Jain).

Claims 10 and 59:

Regarding claims 10 and 59, Jain teaches wherein the type of the labeled change comprises a row insert (Figure 5A, diagram 504, Jain), a row delete (Figure 5C, diagram 574, Jain), a non-key update (column 15, lines 23-28, wherein non-primary field values is interpreted to be the non-key update, Jain), or a key update (Figure 5C, diagram 564, wherein row entry to be update using primary key value, e.g. subset of old values, and wherein < table_name > delete, i.e. old_values, illustrated at the top of Figure 5C as well is defined as the executing point, as defined in applicant specification on page 35, lines 6-7, states the key update is modeled as a deletion of the row with the old key value and insertion of a row with the new key, Jain).

Claims 11 and 60:

Regarding claims 11 and 60, Jain teaches wherein the determining (c) comprises:

(c1) examining a labeled change type, the copy identification, and the propagation control values for the captured change (REFER to claim 49, wherein this limitation has been addressed, Jain), wherein the propagation control values comprises a delete label and a conflict label (REFER to claim 6, wherein this limitation has been addressed, Jain)

Claims 12 and 61:

Regarding claims 12 and 61, Jain teaches wherein the determining further comprises:

(c2) determining that the captured change is to be communicated to the others of the plurality of table copies if the labeled change type is a row insert (Figure 5B1, diagram 534 and 5BC, diagram 570, wherein each field value is equal to its corresponding, or not equal to the corresponding new_value parameter, Jain) and if a copy identification for the captured change is a copy identification assigned to a

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current table copy (column 11, lines 1-7, wherein a current transaction identifier is assigned to the transaction to be stored in the tables, the current transaction is assigned a value that will uniquely identify the table entry, Jain).

Claims 13 and 62:

Regarding claims 13 and 62, Jain teaches wherein the determining further comprises:

(c2) determining that the captured change is to be communicated to the others of the plurality of table copies if the labeled change type is a row delete (Figure 5C, diagram 574, Jain) and if the delete label of the captured change indicates that the captured change is to be communicated (column 16, lines 28-32, wherein the delete operation is performed on the remote table, the global replication variable is reset at processing block, Jain).

Claims 14 and 63:

Regarding claims 14 and 63, Jain teaches wherein the determining further comprises:

(c2) determining that the captured change is to be communicated to the others of the plurality of table copies if the labeled change type is a non-key update (column 15, lines 27-28, wherein updates can be applied to non-primary fields, and Figure 11A and 11B, all features, illustrates a execution of transactional interpreted to be primary key transactions, non-transactional procedures interpreted to be non-primary transactions, Jain) or a key update (column 16, lines 53-55, wherein assigned to the inventory update transaction, wherein transaction_id is the primary key for the transaction table defined in column 7, lines 60-63, Jain) and if neither the delete label nor the conflict label of the captured change indicates that the captured change is not to be communicated (columns 21-22, lines 63-67, and liens 1-4, wherein updates that have occurred to a remote copy to the date may be lost, if the replicated modifications overwrites the current values in the remote copy, wherein the ability to communicate an exception to rollback any changes to a data copy after an exception is detected, Jain), and if a new copy identification of the captured change is a copy identification assigned to a current table copy (column 22,

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lines 32-39, wherein the exceptions table further contains the call identifier of the current calls table entry being processed along with the destination node, i.e. remote copy location, Jain).

Claims 15 and 64:

Regarding claims 15 and 64, Jain teaches wherein the communicating comprises:

(d1) sending information for the captured change to the others of the plurality of table copies (column 7, lines 38-43, wherein DRPC, i.e. deferring remote process control is interpreted to be sending, wherein DRPC is implementing the client server model of distributing computing, which is a request is sent to a remote system to execute a designated procedure using arguments supplied and a result returned to the caller, Jain), wherein if the captured change is a row insert (column 14, lines 16-18, Jain), the information comprises key column values (column 17, lines 26-32, wherein the values are defined, Jain), non-key column values (column 17, lines 59-61, wherein non-primary key columns, and updates are to columns whose values have been changed, Jain), a monotonic number (REFER to claim 49, wherein this limitation has been addressed, Jain), and a copy identification of the captured change (column 18, lines 51-53, wherein any changes made to the tables at the DbA site must be replicated at the DbB site, and vice versa, Jain).

Claims 16 and 65:

Regarding claims 16 and 65, Jain teaches wherein the communicating comprises:

(d1) sending information for the captured change to the others of the plurality of table copies, wherein if the captured change is a row delete (Figure 5C, diagram 574, Jain), the information comprises key column values (REFER to claims 15 and 64, wherein this limitation has been addressed, Jain), a monotonic number (see claim 49, wherein this limitation has already been addressed, Jain), and a copy identification of the captured change (REFER to claims 16 and 65, wherein this limitation has already been addressed, Jain).

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Claims 17 and 66:

Regarding claims 17 and 66, Jain teaches wherein the communicating comprises:

(d1) sending information for the captured change to the others of the plurality of table copies, wherein if the captured change is a non-key update (column 6, lines 57-61, wherein the trigger is interpreted to be the capture, and wherein trigger is a procedure that is executed when a modification occur to a row in a table, column 12, lines 58-64, wherein trigger is initiated when any modification operation is performed on table, an operation that is performed on a remote data entry will result in the initiation of a second trigger, and wherein defined in the applicant specification on page 23, lines 10-12, wherein non-key or key update is setting the copying identification of the updated row in the target table copy to the copy identification received with the communicated change, Jain), the information comprises key column values (column 17, lines 26-32, Jain) wherein values are defined, Jain), new non-key column values (column 17, lines 26-32, wherein new values is defined, Jain), an old monotonic number (column 4, line 8, Jain), a new monotonic number (column 4, line 8, Jain), an old copy identification (column 6, 35-44, Jain), and a new copy identification of the captured change (column 6, 45-49, Jain).

Claims 18 and 67:

Regarding claims 18 and 67, Jain teaches wherein the communicating comprises:

(d1) sending information for the captured change to the others of the plurality of table copies, wherein if the captured change is a key update, the information comprises old key column values, new key column values, new non-key column values, an old monotonic number, a new monotonic number, an old copy identification, and a new copy identification of the captured change (REFER to claims 17 and 66, wherein these limitations have already been addressed, Jain).

Claims 20 and 69:

Regarding claims 20 and 69, Jain teaches wherein the detecting comprises:

(e1i) if the communicated change is a row delete (Figure 5C, all features, wherein the change is communicated and wherein diagram 574, delete the row at the remote site, Jain), the conflict is detected if:

no row of the target table copy (Figure 5B1, diagram 526, wherein row found at remote site, if no, Jain) with key column values matching key column values of the communicated change is identified (Figure 5B1, diagrams 534, wherein corresponding is interpreted to be matching column level, Jain); or

for a row of the target table copy with key column values matching the key column values of the communicated change (Figure 5B1, diagrams 536, wherein corresponding is interpreted to be matching row level, Jain):

a monotonic number of the row of the target table copy does not match the monotonic number of the communicated change (Figure 5B1, diagrams 534, wherein no, is interpreted to be not matching, Jain); or

a copy identification of the row of the target table copy does not match a copy identification of the communicated change (Figure 5B1, diagrams 536, wherein no, is interpreted to be not matching, and wherein matching is interpreted to be a method of corresponding, Jain).

Claims 21 and 70:

Regarding claims 21 and 70, Jain teaches wherein the detecting further comprises:

(e1i) if the communicated change is a row insert, the conflict is detected (columns 22-23, line 67 and lines 10-14, wherein conflict is detected and wherein modifications includes the update, delete, and insert operations, Jain) if:

a row of the target table copy with key column values matching key column values of the communicated change is identified (Figure 5B1, diagrams 536, wherein corresponding is interpreted to be matching row level, Jain).

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Claims 22 and 71:

Regarding claims 22 and 71, Jain teaches wherein the detecting further comprises:

(e1 i) if the communicated change is a non-key update (REFER to claims 10 and 59, wherein this limitation has been addressed, Jain), the conflict is detected if:

no rows of the target table copy with key column values matching key column values of the communicated change is identified (Figure 2D1, all features, wherein before replication is defined and illustrates Database A and Database B, and wherein the rows aren't matched, Jain); or

for a row of the target table copy with key column values matching the key column values of the communicated change (Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, and Database B, before the replication and Database A, after replication have the same column values, i.e. matches, and wherein the headings of item and quantity on hand are identified, the rows are matched, Jain):

a monotonic number of the row of the target table copy does not match the old monotonic number of the communicated change (Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, Database A and Database B, wherein widget is interpreted to be the monotonic number, wherein the numbers aren't the same, Jain); or

a copy identification of the row of the target table copy does not match an old copy identification of the communicated charge (Figure 2D2, all features, wherein AFTER DBA=>DBB replication is illustrated, and wherein Database A is interpreted to be the old copy, and Database B is interpreted to be the copy identification of the row of the target table copy, wherein the rows are different, i.e. site indicates DB_A and DB_B, Jain).

Claims 23 and 72:

Regarding claims 23 and 72, Jain teaches wherein the detecting further comprises;

(e1 i) if the communicated change is a key update, the conflict is detected if:

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no row of the target table copy with key column values matching old key column values of the communicated change is identified (Figure 2D1, all features, wherein before replication is illustrated as well as defined, Database A and Database B, the row table aren't matched nor is the communicated change, interpreted to be wherein the inventory columns are identified, Jain); or

for a row of the target table copy with key column values matching the old key column values of the communicated change (column 18, lines 1-8 and Figure 2D1, all features, wherein before replication is defined and illustrates Database B and after DBB=>DBA replication, wherein Database B is defined, the row communicated, wherein the modifications are matched in the local to the remote sites and Database B, Jain):

a monotonic number of the row of the target table copy does not match an old monotonic number of the communication change (column 10, lines 11-15 and Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, Database A and Database B, wherein widget is interpreted to be the monotonic number, wherein the numbers aren't the same, Jain); or

a copy identification of the row of the target table copy does not match an old copy identification for the communicated change (Figures 2B, diagrams 120 and 130 and Figure 2C, diagrams 120 and 130 further defined in column 18, lines 53-57, wherein a decrease in inventory by the quantity ordered and entry is inserted in the orders tables to retain information and replicated, i.e. in Figure 2C and Figure 2D2, all features, wherein AFTER DBA=>DBB replication is illustrated, and wherein Database A is interpreted to be the old copy, and Database B is interpreted to be the copy identification of the row of the target table copy, wherein the rows are different, i.e. site indicates DB_A and DB_B, Jain); or

a row of the target table copy with key column values matching new key column values of the communicated change is identified (Figure 2D1 all features, wherein DBB=>DBA, illustrates a row, wherein DB_B is communicated to Database A and column 18, lines 1-8, Jain).

Claims 24 and 73:

Regarding claims 24 and 73, Jain teaches wherein the determining comprises:

(e2i) assigning priority to the communicated change (columns 10-11, line 65-67 and lines 1-5, Jain), if no conflict is detected (Figure 9B, diagram 920, wherein whether or not a discrepancy is detected or not, further defined in column 19, lines 56-57, Jain).

Claims 25 and 74:

Regarding claims 25 and 74, Jain teaches wherein the determining comprises:

(e2i) assigning priority to the communicated change if the communication change is a row insert (column 13, lines 21-22, wherein modification entry is inserted in replication tables, Jain);

and

a monotonic number of the communicated change is greater than a monotonic number of the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2; Jain); or

the monotonic number of the communicated change is equal to the monotonic number of the conflicting row (column 16, lines 24-28, wherein the field value, interpret to be monotonic number, is equal to its corresponding old value parameter and column 18, lines 8-10, Jain), and a copy identification of the communication change is greater than a copy identification of the conflicting row (column 10, lines 8-15, wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A, C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain).

Claims 26 and 75:

Regarding claims 26 and 75, Jain teaches wherein the determining comprises:

(e2i) assigning priority to the communicated change (REFER to claims 24 and 73, wherein the limitation has been addressed, Jain) if the communicated change is a row delete (column 14, lines 22-26, Jain) and if:

no row in the target table copy matches key column values of the communicated change (column 16, lines 15-19, wherein the not equal to it's corresponding value and Figure 2D1, all features, wherein before replication is defined and illustrates Database A and Database B, and wherein the rows aren't matched, Jain); or

a monotonic number of the communicated change is greater than a monotonic number of the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2, Jain); or

the monotonic number for the communicated change is the same as the monotonic number for the conflicting row and a copy identification of the communication change is greater than a copy identification of the conflicting row (column 18, lines 8-10, Jain), and a copy identification of the communication change is greater than a copy identification of the conflicting row (column 10, lines 8-15, wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A, C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain).

Claims 27 and 76:

Regarding claims 27 and 76, Jain teaches wherein the determining comprises:

(e2i) assigning priority to the communicated change (REFER to claims 24 and 73, wherein the limitation has been addressed, Jain) if the communicated change is a non-key update (column 17, lines 58-59, wherein concurrent updates can be made to non-primary key columns, Jain) and if:

no row in the target table copy matches key column values of the communicated change (Figure 2D1, all features, wherein before replication is illustrated as well as defined, Database A and Database B, the row table aren't matched nor is the communicated change, interpreted to be wherein the inventory columns are identified, Jain); or

a monotonic number of the communicated change is greater than a monotonic number of the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2, Jain); or

the monotonic number of the communicated change is the same as the monotonic number of the conflicting row and a copy identification of the communicated change is greater than a copy identification of the conflicting row (column 10, lines 8-15, wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A, C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain).

Claims 28 and 77:

Regarding claims 28 and 77, Jain teaches wherein the determining comprises:

(e2i) assigning priority to the communicated change if the communicated change (Figure 6, all features wherein the first call is interpreted to be priority and columns 10-11, line 65-67 and lines 1-5, Jain) is a key update (Figure 7A, diagram 714, wherein the queue_call_args in Figure 6, diagram 618, continues onto Figure 7, wherein the arguments are executed and column 12, lines 6-11, wherein the parameter is updated shown in Figure 7A, diagram 714, Jain) and if:

(e2iA) no row in the target table copy matching old key column values of the communicated change is identified (Figure 2D1, all features, wherein before replication is illustrated as well as defined, Database A and Database B, the row table aren't matched nor is the communicated change, interpreted to be wherein the inventory columns are identified, Jain), and

(e2iA (I)) no row in the target table copy matching new key column values of the communicated change is identified (Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, and Database B, before the replication and Database A, after replication have the same column values, i.e. matches, and wherein the headings of item and quantity on hand are identified, the rows are matched, Jain); or

(e2iA (II)) a new monotonic number of the communicated change is greater than a monotonic number for the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2, Jain)

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with key column values matching new key column values of the communicated change (Figure 2D1 all features, wherein DBB=>DBA, illustrates a row, wherein DB_B is communicated to Database A and column 18, lines 1-8, Jain), or

(e2iA (III)) the new monotonic number of the communicated change matches the monotonic number (column 4, lines 18-21, Jain) and a copy identification of the conflicting row in the target table copy with key column values matching new key column values of the communicated change, respectively (column 4, lines 23-31, wherein the procedure-level replication modifies a remote site based on the logical operations used to modify data at the originating site, and wherein a procedure-level replication provides the ability to identify conflicting updates and the same logical operations performed on one copy of a data item can be propagated to all other copies of the same data item and information concerning conflicts identified by the present invention can be retained in the replication tables, Jain); or

(e2iB) an old monotonic number of the communicated change is greater than the monotonic number of the conflicting row in the target table copy with key columns matching old key column values of the communicated change (column 18, lines 1-8 and Figure 2D1, all features, wherein before replication is defined and illustrates Database B and after DBB=>DBA replication, wherein Database B is defined, the row communicated, wherein the modifications are matched in the local to the remote sites and Database B, Jain); or

the monotonic number of the communicated change matches the monotonic number of the conflicting row and an old copy identification of the communicated change is greater than the copy identification (column 10, lines 8-15, wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A, C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain) of the conflicting row with key column values matching old key column values of the communicated change (column 18, lines 1-8 and Figure 2D1, all features, wherein before replication

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is defined and illustrates Database B and after DBB=>DBA replication, wherein Database B is defined, the row communicated, wherein the modifications are matched in the local to the remote sites and Database B, Jain); and

(e2iB (I)) no row in the target table copy matching new key column values in the communicated change is identified (REFER to claims 23 and 72, wherein this limitation has been addressed, Jain); or

(e2iB (II)) the new monotonic number of the communicated change is greater than the monotonic number of the conflicting row with key column values matching the new key column values of the communicated change (column 18, lines 1-8, wherein a row-level replication scheme determines that a remote site's current values match old values for all columns in a table entry prior to applying an update at a remote site, wherein the column-level replication checks only those columns that were changed by the original update, i.e. indicated by a difference between the values of the corresponding old and new parameters and if the old value parameters of the changed columns are equal to their corresponding values at the remote site, the loss of an intermediate update is unlikely, and the update operation can be completed, Jain); or

(e2iB (III)) the monotonic number of the communicated change matches the monotonic number of the conflicting row and the new copy identification of the communicated change is greater than the copy identification of the conflicting row with key column values matching the new key column values of the communicated change (column 25-28, wherein all of the field values in the remote table entry are equal to their corresponding old_sub_value parameters processing continues at processing block, Jain).

Claims 30 and 79:

Regarding claims 30 and 79, Jain teaches wherein the controlling comprises:

(e3iA) if the communicated change is a row insert, setting a copy identification of the applied change to the target table copy to a copy identification received with the communicated change (Figure 4,

diagram 402, wherein the trigger can check the global variable in the replication procedure or an original procedure, defined in column 13, lines 30-32, and lines 25-32, wherein setting a global variable, i.e. a variable that can be accessed by an trigger or replication, and perform replication is interpreted to be receiving the change, Jain).

Claims 31 and 80:

Regarding claims 31 and 80, Jain teaches wherein the controlling comprises:

(e3iA) if the communicated change is a row delete, updating a row of the target table copy with key column values matching key column values of the communicated change by setting the delete label to indicate not to propagate the applied change (column 16, lines 10-20, wherein the remote table entry is deleted from the remote table, and wherein after the delete operation is performed on the remote table entry, the global replication variable is reset at processing and processing ends, and wherein if, at the decision block, i.e., "should lost updates be prevented, existing modifications should be preserved, processing continues at decision block, and at the decision block i.e., "is each field value in the row equal to its corresponding old_sub_value parameter, and if any of the remote table entry's field values do not equal its corresponding old_sub_value parameter, processing continues at processing block, Jain).

Claims 32 and 81:

Regarding claims 32, and 81, Jain teaches wherein the controlling comprises:

(e3iA) if the communicated change is a non-key or key update, setting a copy identification of the applied change to the target table copy to the copy identification received with the communicated change (Figure 4, diagram 402, wherein the trigger can check the global variable in the replication procedure or an original procedure, column 13, lines 30-32, and lines 25-32, wherein setting a global variable, i.e. a variable that can be accessed by an trigger or replication, perform replication and column 13, lines 54-62, wherein changes are applied to the table, Jain).

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Claims 33 and 82:

Regarding claims 33 and 82, Jain teaches wherein the insuring comprises:

(e3iiA) insuring propagation of an implicit delete change in the target table copy by setting a conflict label of the propagation controls of the conflicting row when the communicated change is a row insert, row delete, or non-key update assigned priority (column 6, lines 53-63, Jain), and a copy identification of the conflicting row is a copy identification assigned to the target table copy (columns 12-14, lines 62-64, wherein replicate value changes in the local copy can be executed at remote sites to replicate data modifications performed on local data and lines 9-15, wherein identify the row that is the target of the modification, and wherein the old values would be used to detect conflicts, Jain).

Claims 34 and 83:

Regarding claims 34 and 83, Jain teaches wherein the insuring comprises:

(e3iiA) insuring propagation of a delete change in the target table by setting a conflict label of the propagation controls of the conflicting row (column 15, lines 10-20, wherein check is done to see if modification has been made, and wherein current update operation might be erased is the update is performed on remote data, and so forth, Jain) with key column values matching old key column values of the communicated change (Figure 5B1, diagrams 534, wherein corresponding is interpreted to be matching column level, Jain), when the communicated change is a key update assigned priority (Figure 5B1, diagrams 544, wherein update the row such that each filed value is updated with its corresponding new value, Jain), and a copy identification of the conflicting row matches a copy identification assigned to the target table copy (columns 12-14, lines 62-64, wherein replicate value changes in the local copy can be executed at remote sites to replicate data modifications performed on local data and lines 9-15, wherein identify the row that is the target of the modification, and wherein the old values would be used to detect conflicts, Jain); and

(e3iiB) insuring propagation of a delete change in the target table copy by setting a conflict label of the propagation controls of the conflicting row with key column values matching new key column values of the communicated change, when the communicated change is a key update assigned priority, and a copy identification of the conflicting row is a copy identification assigned to the target table copy (REFER to claims 34 and 83, wherein the following limitations have been addressed, Jain)

Claims 35 and 84:

Regarding claims 35 and 84, Jain teaches wherein the insuring comprises:

(e3iiA) recording communicated old key column values, an old monotonic number, and an old copy identification of a conflicting change in the target table copy in a delete tombstone, when the communicated change is a conflicting delete or a conflicting update with conflicting communicated old monotonic number or copy identification (column 20, lines 11-13, wherein save point is defined and interpreted to be a method of recording, column 21, lines 46-49, wherein a save point is being established, Jain).

Claims 36 and 85:

Regarding claims 36 and 85, Jain teaches wherein the insuring comprises:

(e3iiA) checking for matching delete (column 21 lines 4-8, Jain) and suppressing application of the communication change (Figure 11A2, diagram 1128, and column 20, lines 9-16, wherein modifications can be undone, Jain) if a delete tombstone matching the new key columns (Figure 11A2, diagram 1127 and column 20, lines 60-64, wherein if they are equal, Jain), new monotonic number, and new copy identification of the communicated change is found (column 19, lines 57-63, Jain), when the communicated change is an insert change or an update change with a conflicting insert assigned priority (column 18, lines 54-57, wherein entry is inserted reflection change in decrease, Jain).

Claims 37 and 86:

Regarding claims 37 and 86, Jain teaches reporting each conflicting change (column 10, lines 4-15, wherein exceptions table is used to store information related to any exceptional or occurrence during executions of a deferred transaction, wherein one transaction, T1, can update one copy of record A, C1, and a second transaction, T2, can update a second copy of record A, C2. If T1 is propagated to C2, T1 can overwrite T2's update, and vice versa, detects this type of exception, and others, and retains information for each exception, Jain).

Claims 38 and 87:

Regarding claims 38 and 87, Jain teaches wherein the reporting comprises:

(f1) reporting conflicting changes of a row delete, a row insert, or a non-key update change only when priority is not assigned to the communicated change (Figure 6, diagram 601, wherein the first call isn't assign, wherein no is identified, Jain) and a copy identification for a conflicting row in a target table copy is the copy identification assigned to the target table copy (columns 12-14, lines 62-64, wherein replicate value changes in the local copy can be executed at remote sites to replicate data modifications performed on local data and lines 9-15, wherein identify the row that is the target of the modification, and wherein the old values would be used to detect conflicts, Jain).

Claims 39 and 88:

Claims 39 and 88, Jain teaches wherein the reporting comprises:

(f1) reporting conflicting changes of a key update change only when priority is not assigned to the communicated change (REFER to 35 and 84, wherein this limitation has been addressed, Jain); and

a copy identification for a conflicting row in a target table copy with key column values matching old key column values for the communicated change is the copy identification assigned to the target table copy (column 22, lines 7-14, wherein old and new values as part of its parameters, a potential conflict can be detected by comparing the old values of the row at the original updating site

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with the current value of the row at the targeted site for the replicated modification, and wherein the values are different, a conflict exists between the local and remote data copies, Jain); or

a copy identification for a conflicting row with key column values matching new key column values of the communicated change is the copy identification assigned to the target table copy (column 22, lines 13-22, wherein if the values are different, a conflict exists between the local and remote data copies, wherein the order processing example described includes a error detection, wherein the order processing for example, the place order remote process includes examination of the local and remote copies of the order status and the ability for an application to identify conflicts within one of its procedures, Jain).

Prior Art of Record

1. Jain et al (US Patent No. 5,806,075) discloses the ability to replicate modifications made at a local site to multiple remote sites in a peer-to-peer environment.
2. Stamos et al (US Patent No. 6,058,401) disclose communication costs are reduced in a distributed system that supports data replication with conflict detection by sending small values or nulls as replacements for filed values that are not strictly used for replication or conflict detection.
3. Shih et al (US Patent No. 6,615,213) discloses a method and mechanism for data replication.

Point of Contact


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helene R. Rose whose telephone number is (571) 272-0749. The examiner can normally be reached on 8:00am - 4:30pm M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (571) 272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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March 23, 2006


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